Fermilab

NuMI Air Cooling System
Centrifugal Fan Specification
#MD-ENG-032

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1.0 Scope

1.1 This specification is for a single inlet centrifugal fan and variable speed electric motor driver.

1.2 Vendor shall quote a standard fan-motor unit with standard options. Vendor shall note all specification requirements that are not included in the quotation.

1.3 Vendor technical and cost-saving suggestions are welcome.

2.0 Design Conditions

2.1	Quantity	One unit.
2.2	Fluid	Air and water vapor
2.3	Altitude	600 feet above mean sea level
2.4	Barometric pressure	14.4 psia
2.5	Inlet pressure range	14.3 psia to 14.6 psia
2.6	Inlet temperature range	50 F to 60 F
2.7	Dry air flow rate	28,000 scfm
2.8	Density at standard conditions	0.075 Lbm/cubic foot
2.9	Inlet volume of dry air	28,264 icfm @ min. pressure & max temp
2.10	Relative humidity range	50 to 85%
2.11	Static discharge pressure	14" WC above inlet pressure
2.12	Full size supply duct velocity	2100 feet per minute
2.13	Fan total pressure	14.3" WC above inlet pressure

2.14 Fan shall be sized to produce the specified total pressure at the design flow.

2.15 Fan orientation is shown in Figure 1.

2.16 The specified static discharge pressure includes System Effect Factors for the fan.

2.17 Fan design operating point shall be between $^1/_2$ and $^3/_4$ of the peak pressure.

2.18 Fan air performance shall be AMCA certified.

2.19 The fan will operate in a closed loop system.

2.20 Customer will install the fan either on a concrete floor or on a stout structural steel frame.

2.21 The unit will be installed indoors. The temperature range will be 50 to 75 F. The relative humidity will be 50 to 100%.

3.0 Details

3.1 Vendor shall quote an option for performance testing the fan.

3.2 Vendor shall submit all standard QA records for the fan.

3.3 The fan shall be directly driven by a TEFC electric motor.

3.4 The fan and motor shall be mounted on a single, structural base.

3.5 Dimension "A" in Figure 1 shall be no more than 75 inches.

3.6 The fan and motor shall be aligned and tested at the factory before shipment.

3.7 The motor shall be non-overloading over the entire pressure-volume curve.

3.8 Motor voltage shall be 480 VAC, 3-phase, 60 hertz.

3.9 The motor shall have a minimum service factor of 1.15. The motor shall not operate in the service factor at the design point.

3.10 The motor shall be suitable for continuous operation with a VFD speed controller.

3.11 Fan impeller shall be keyed to the shaft.

3.12 Fan-motor unit shall be suitable for continuous operation at any point on the pressure-volume curve.

3.13 Fan and motor bearings shall have grease fittings.

3.14 Vendor shall state the expected life of the proposed bearings.

3.15 Vendor shall quote an option for extended-life bearings.

3.16 Fan-motor unit shall be provided with factory-installed vibration isolators.

3.17 A crane will be used to pickup and move the fan. Vendor shall show lift points in the quotation. Vendor shall state if lifting lugs or tapped holes for swivel hoist rings are available as an option.

3.18 Vendor shall quote standard options for making the fan leak resistant.

3.19 Vendor shall provide recommended maintenance schedule in the quotation.

3.20 Vendor shall provide recommended spare parts list in the quotation.

3.21 Vendor shall quote an option for painting the unit with an epoxy paint/coating.

4.0 Pressure -Volume Curves

4.1 Vendor shall provide the following pressure-volume curves in the quotation:

4.1.1 Design point.

4.1.2 50% of design speed.

4.1.3 Minimum speed but not lower than 10% of design speed.

5.0 Fabrication Approval Drawings

5.1 Vendor shall submit fabrication approval drawings with certified dimensions for the fan-motor unit within 2 weeks after receiving an order.

6.0 Shipping

6.1 Fan shall be completely closed to keep debris out.

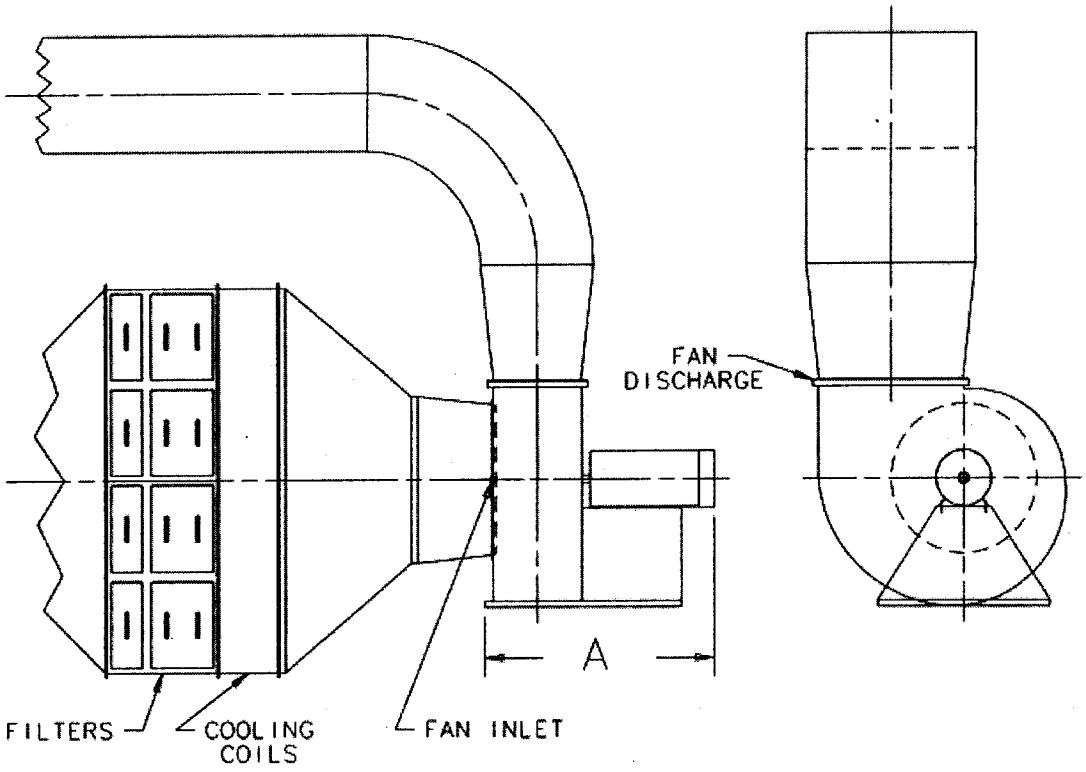

Figure 1. Fan orientation in customer system.